

CLAIMS

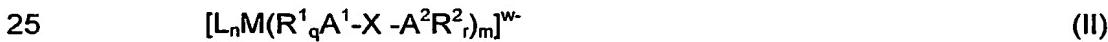
1. Catalyst composition comprising a salt of a non- or weakly coordinating anion,  
5 said non- or weakly coordinating anion comprising at least one metal or  
metalloid ion M with valency  $v+$ , v representing an integer between 1 and 5,  
and at least one bidentate ligand coordinating to this metal or metalloid ion,  
and a catalyst that can be activated by said non- or weakly coordinating anion,  
characterized in that said bidentate ligand is a bidentate monoanionic ligand of  
10 formula (I):



wherein

- 15 X represents a bridging moiety;  
A<sup>1</sup> and A<sup>2</sup> are each independently chosen from the group comprising N, O, P,  
S, and C;  
R<sup>1</sup> and R<sup>2</sup> are each independently chosen from the group comprising an  
optionally substituted linear or branched (hetero)alkyl group, an optionally  
20 substituted (hetero)aryl group, and a Si containing group; and  
q and r each independently represent an integer with  $0 \leq q, r \leq 2$ .

2. Catalyst composition according to claim 1, wherein the non- or weakly  
coordinating anion has formula (II):



wherein

- M, X, A<sup>1</sup>, A<sup>2</sup>, R<sup>1</sup>, R<sup>2</sup>, q, r, and v are defined as above;  
L represents a ligand to M or a bridging moiety between two M atoms;  
30 n is an integer with  $0 \leq n \leq 5$ ;  
m is an integer with  $1 \leq m \leq 6$ ;  
 $n + m > v$ ;  
 $n + m \leq 6$ ;  
w is an integer with  $1 \leq w \leq 3$ ; and

the ligands ( $R_1^q A^1 - X - A^2 R_2^r$ )<sup>-</sup> may be the same or different.

3. Catalyst composition according to claim 1, wherein the non- or weakly coordinating anion has formula (III):

$$5 \quad [L^1_{z_1} L^2_{z_2} M_x (R^1_q A^1 - X^1 A^2 R^2_r)]^w$$

(III)

wherein

M, X, A<sup>1</sup>, A<sup>2</sup>, R<sup>1</sup>, R<sup>2</sup>, q, r, v and w are defined as above;

$L^1$  is an end-capped or corner-bridging bidentate ligand;

10 **L<sup>2</sup> is a core building ligand;**

**x** is an integer with  $2 \leq x \leq 10$ :

y is an integer with  $0 \leq y \leq 20$ ;

**z1** and **z2** are integers with  $0 \leq z1,z2 \leq 20$ :

$y + z_1 + z_2 > xv$ ; and

the ligands  $(R_1^1A^1-X-A^2R_2^2)^-$  may be the same or different.

4. Catalyst composition according to any one of claims 1-3, wherein M represents a metal of any one of the Groups 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 or 12, an actinide metal or a lanthanide metal.
  5. Catalyst composition according to claim 4, wherein M represents Zn.
  6. Catalyst composition according to any one of claims 1-5, wherein the charge of the bidentate monoanionic ligand of formula  $(R^1_qA^1-X-A^2R^2_r)^-$  is delocalized over the moiety  $A^1-X-A^2$ .
  7. Catalyst composition according to any one of claims 1-6, wherein  $(R^1_qA^1-X-A^2R^2_r)^-$  represents  $(R^5N-N-NR^6)^-$ , wherein R<sup>5</sup> and R<sup>6</sup> are each independently chosen from the group comprising an optionally substituted linear or branched (hetero)alkyl group, an optionally substituted (hetero)aryl group, and a Si containing group.
  8. Catalyst composition according to any one of claims 1-7, wherein the salt of the non- or weakly coordinating anion comprises a cation chosen from the group comprising N,N-dimethylanilinium, R<sup>7</sup><sub>3</sub>Si, wherein R<sup>7</sup> represents an optionally substituted linear or branched (hetero)alkyl group, an optionally substituted (hetero)aryl group, or a Si containing group, triphenylcarbenium, and Li<sup>+</sup>.
  9. Catalyst composition according to any one of claims 1-8, wherein the catalyst

that can be activated by said anion is a single site catalyst.

10. Process for the polymerization of olefins, wherein at least one catalyst composition according to any one claims 1-9 is used.
11. Process according to claim 10, the process resulting in the formation of High Density PolyEthylene (HDPE), Low Density PolyEthylene (LDPE) or Linear Low Density PolyEthylene (LLDPE).
- 5 12. Process according to claim 10, the process resulting in the formation of ultra-high molecular weight polyethylene (UHMWPE), the UHMWPE having a weight average molecular weight, as measured by Size Exclusion Chromatography (SEC), of more than 800,000 g/mol.
- 10 13. Process according to claim 10, the process resulting in the formation of PolyPropylene (PP), Random Copolymer Polypropylene (RCP) or Elastomer Modified PolyPropylene (EMPP).
14. Process according to claim 10, the process resulting in the formation of amorphous or rubbery copolymers based on ethylene and at least one other  $\alpha$ -olefin.
- 15 15. Process for the preparation of a compound of formula (IV):



20

wherein

M, X, A<sup>1</sup>, A<sup>2</sup>, R<sup>1</sup>, R<sup>2</sup>, q, r, v, L, n, m and w are defined as for the compound of formula (II);

[C]<sup>c+</sup> is a cation;

25 c = 1 or 2;

c is an integer with  $1 \leq c \leq 3$ ;

c = w/c, and

the ligands  $(R^1_q A^1-X-A^2 R^2_r)^-$  may be the same or different;

the process comprising the following steps:

- 30 i) contacting an alkylated compound comprising the unit  $MR^8_t$ , wherein R<sup>8</sup> is an optionally substituted linear or branched (hetero)alkyl group, an optionally substituted (hetero)aryl group, or a Si containing group, and t is an integer with  $1 \leq t \leq 4$ , with  $(R^1_q A^1-X-A^2 R^2_r)H$  to form a compound of formula  $M(R^1_q A^1-X-A^2 R^2_r)_u R^8_{t-u}$ , wherein u is an integer with  $1 \leq u \leq 4$ ;

- ii) contacting  $(R^1_qA^1-X-A^2R^2_r)H$  with  $[K]^{k+}H_k$  in a solvent that is not capable of donating an electron pair, to form  $(R^1_qA^1-X-A^2R^2_r)_k[K]^{k+}$ , wherein K is an alkali or alkaline earth metal, and k is 1 or 2  
iii) contacting the product obtained in i) with the product obtained in ii),  
5 resulting in the formation of  $[K]^{k+}[L_nM(R^1_qA^1-X-A^2R^2_r)_m]^{w-}$   
iv) exchanging  $[K]^{k+}$  for  $[C]^{c+}$ , resulting in the formation of  $[C]^{c+}[L_nM(R^1_qA^1-X-A^2R^2_r)_m]^{w-}$ .

16. Compound of formula (V):

10  $[C]^{c+}[L_nM(R^5-N-N-N-R^6)_m]^{w-}$  (V)

wherein

M, L, n, m,  $[C]^{c+}$ , c, l and w are defined as for the compound of formula (IV);

15  $R^5$  and  $R^6$  are each independently chosen from the group comprising an optionally substituted linear or branched (hetero)alkyl group, an optionally substituted linear or branched (hetero)aryl group, and a Si containing group.

17. Compound of formula (VI):

20  $[C]^{c+}[L^1_{z1}L^2_{z2}M_x(R^5N-N-N-R^6)_y]^{w-}$  (VI)

wherein

M,  $R^5$ ,  $R^6$ ,  $[C]^{c+}$ , c, l and w are defined as for the compound of formula (V);

L<sup>1</sup>, L<sup>2</sup>, z1, z2, x, y, and v are defined as for the compound of formula (III);

25 the ligands  $(R^1_qA^1-X-A^2R^2_r)$  may be the same or different.

18. Compound according to claim 16 or claim 17, wherein M represents Zn.